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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Stephan J. Jourdan

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EXAMINER

RUTZ, JARED IAN

ART UNIT

PAPER NUMBER

2187

DATE MAILED: 09/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/743,285	JOURDAN ET AL.	
	Examiner	Art Unit	
	Jared I. Rutz	2187	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 11, 17-19 and 25-27 is/are rejected.
- 7) ☐ Claim(s) 6-10, 12-16, and 20-24 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-27 are pending in the instant application. Applicant's arguments submitted 8/10/2006 have been carefully and fully considered, but they are not persuasive. Accordingly, this Office action is made **FINAL**.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. **Claims 1-5, 11, 17-19, and 25-27** are rejected under 35 U.S.C. 102(b) as being anticipated by Doing et al. (US 6,161,166).

1. **Claim 1** is taught by Doing as:

a. *A method of processing addresses, comprising: receiving a full linear address of an instruction, and reducing a size of the full linear address to obtain a reduced linear address.* Column 10 lines 26-36 show that a hash function is used to convert the effective address to a 7 bit value.

2. **Claim 2** is taught by Doing as:

b. *The method of claim 1, further including hashing a subset of the full linear address to reduce the size of the full linear address. Column 10 lines 26-27 show that bits 45-51 of the effective address are used in the hash function.*

3. Claim 3 is taught by Doing as:

c. *The method of claim 2, wherein the full linear address includes one or more line offset bits and one or more set index bits, the method further including isolating the offset bits and the set index bits from the hashing. Column 10 lines 26-27 show that only bits 45-51 of the effective address are used in the hash function, therefore isolating the offset and set index bits from the hashing.*

4. Claim 4 is taught by Doing as:

d. *The method of claim 2, further including hashing a thread signature with the subset of the full linear address. The hash function shown in column 10 lines 34-35 includes the input ActT, which is shown in column 10 lines 31-32 to indicate which of the threads is active.*

5. Claim 5 is taught by Doing as:

e. *The method of claim 1, further including retrieving a data block from a data array if the reduced linear address corresponds to a tag in a tag array, the tag array being associated with the data array. Column 10 lines 20-24 show that the*

ERAT contains a portion of the effective address, the tag, and a portion of a real address, a data block.

6. Claim 11 is taught by Doing as:

f. *A method of retrieving data, comprising: receiving a full linear address of an instruction; reducing a size of the full linear address to obtain a reduced linear address. Column 10 lines 26-36 show that a hash function is used to convert the effective address to a 7 bit value.*

g. *The reducing including hashing a subset of the full linear address.*

Column 10 lines 26-27 show that bits 45-51 of the effective address are used in the hash function.

h. *Isolating one or more cache line offset bits of the full linear address and one or more set index bits of the full linear address from the hashing. Column 10 lines 26-27 show that only bits 45-51 of the effective address are used in the hash function, therefore isolating the offset and set index bits from the hashing.*

i. *And retrieving a data block from a data array if the reduced linear address corresponds to a tag in a tag array, the tag array being associated with the data array. Column 10 lines 20-24 show that the ERAT contains a portion of the effective address, the tag, and a portion of a real address, a data block.*

7. Claim 17 is taught by Doing as:

j. *An address processing unit comprising: a data structure having a data array and a tag array. See figure 4A, which shows ERAT, item 301, containing a section for the effective address, the tag array, and a section for the real address, the data array.*

k. *A reduction module to reduce a size of a full linear address of an instruction to obtain a reduced linear address. Column 10 lines 26-36 show that a hash function is used to convert the effective address to a 7 bit value.*

l. *And a retrieval module to retrieve a data block from the data array if the reduced linear address corresponds to a tag in the tag array. Column 10 lines 36-39 show that the appropriate ERAT entry is selected by select logic 401 of figure 4A in accordance with the hash function..*

8. Claim 18 is taught by Doing as:

m. *The address processing unit of claim 17, wherein the reduction module is to hash a subset of the full linear address to reduce the size of the full linear address. Column 10 lines 26-27 show that bits 45-51 of the effective address are used in the hash function.*

9. Claim 19 is taught by Doing as:

n. *The address processing unit of claim 18, wherein the full linear address is to include one or more line offset bits and one or more set index bits, the reduction module to isolate the offset bits and the set index bits from the hashing.*

Column 10 lines 26-27 show that only bits 45-51 of the effective address are used in the hash function, therefore isolating the offset and set index bits from the hashing.

10. Claim 25 is taught by Doing as:

- o. *A computer system comprising: a random access memory. Figure 1A item 102.*
- p. *A bus coupled to the memory. Figure 1A item 109*
- q. *And a processor coupled to the bus, the processor to receive an instruction from the memory and including an address processing unit having a data structure, a reduction module and a retrieval module. Figure 1A item 101.*
CPU 101 is shown to contain I-cache 106. I-cache 106 is shown in column 8 lines 3-4 to contain ERAT 301. ERAT 301 contains a data structure, a reduction module, and a retrieval module.
- r. *The data structure having a data array and a tag array. Figure 4A shows ERAT 301, which contains a section for the effective address, the tag array, and a section for the real address, the data array.*
- s. *The reduction module to reduce a size of a full linear address of the instruction to obtain a reduced linear address. Column 10 lines 26-36 show that a hash function is used to convert the effective address to a 7 bit value.*
- t. *The retrieval module to retrieve a data block from the data array if the reduced linear address corresponds to a tag in the tag array. Column 10 lines*

36-39 show that the appropriate ERAT entry is selected by select logic 401 of figure 4A in accordance with the hash function.

11. Claim 26 is taught by Doing as:

u. *The computer system of claim 25, wherein the reduction module is to hash a subset of the full linear address to reduce the size of the full linear address.*

Column 10 lines 26-27 show that bits 45-51 of the effective address are used in the hash function.

12. Claim 27 is taught by Doing as:

v. *The computer system of claim 26, wherein the full linear address is to include one or more line offset bits and one or more set index bits, the reduction module to isolate the offset bits and the set index bits from the hashing. Column 10 lines 26-27 show that only bits 45-51 of the effective address are used in the hash function, therefore isolating the offset and set index bits from the hashing.*

Allowable Subject Matter

13. Claims 6-10, 12-17, and 20-24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

14. Claims 6, 12, and 20 recite the limitation "wherein the data array is a prediction array of a branch predictor, the data block including a branch prediction address having

a size that equals a size of the reduced linear address.” The invention disclosed by Doing does not teach or suggest using a reduced linear address to locate a branch prediction address.

15. **Claims 7, 13, and 21** recite the limitation “wherein the data array is a cache array of a cache, the data block including a stored linear address having a size that equals the size of the full linear address.” While the invention disclosed by Doing is a cache, it only stores bits 0-46 of the effective address. Column 10 lines 42-46 state that is unnecessary to hold bits 47-51 because they were used in the hash function.

Response to Arguments

16. Applicant's arguments filed 8/10/2006 have been fully considered but they are not persuasive.

17. First point of Argument

18. In the second paragraph of page 9, Applicant argues with respect to claims 1, 11, 17, and 25 “*no reduction in the size of the effective address is performed at all in Doing. Seven bits of the effective address are received and converted into seven bits as the output of the hash function. Since no reduction in size of the effective address occurs in Doing, this reference fails to teach this feature of claim 1. A similar argument applies to claims 11, 17, and 25 as well.*” The Examiner respectfully disagrees. As noted by Applicant at line 15 of page 8 and shown by Doing at column 8 lines 29-30, an effective address is 64 bits. As noted by Applicant at lines 4-6 of page 9 and shown by Doing at column 10 lines 26-35, seven bits of the effective address are used to generate a seven

bit address to access a look up table. Accordingly, Doing teaches taking a 64 bit address and reducing it in length to obtain a reduced address, as shown *supra* with respect to claims 1, 11, 17, 17, and 25.

19. Second point of Argument

20. In the third paragraph of page 9, Applicant argues with respect to claims 2, 11, 18, and 26 "*Though a hashing function is described in Doing, that function does not hash a subset of the full linear address to reduce the size of the full linear address as called for in this claim.*" The Examiner respectfully disagrees. As noted by Applicant at lines 4-6 of page 9 and shown by Doing at column 10 lines 26-35, seven bits of the effective address are hashed to generate a seven bit address to access a look up table. Accordingly, Doing teaches hashing a subset, bits 45-51, of a full linear address, the 64 bit effective address, to produce an address of reduced size, the 7 bit output of the hash function shown at column 10 lines 34-35.

21. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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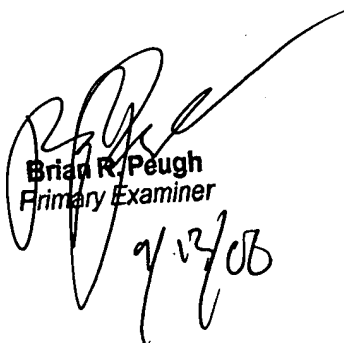
the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jared I. Rutz whose telephone number is (571) 272-5535. The examiner can normally be reached on M-F 8:00 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Sparks can be reached on (571) 272-4201. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

jir



Brian R. Peugh
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9/13/08

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Art Unit 2187